

REMARKS

This Response is submitted in response to the Office Action dated May 4, 2004, having a shortened statutory period set to expire August 4, 2004. Claims 1-3 and 5-6 have been amended, claims 4 and 7-9 have been cancelled, and claims 10-16 have been added.

Objections to the Specification:

The specification, on page 1, has been amended to include the U.S. Patent Application Numbers or issued patent numbers of the related and cross-referenced patent applications.

Double Patenting:

Claims 1-9 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Pat. No. 6,195,627. While Applicants contend that amended claims 1-3 and 5-6 and newly added claims 10-16 are not obvious variants of the invention claimed in U.S. Pat. No. 6,195,627, a terminal disclaimer has been filed herewith to preclude further contention and expedite prosecution of the present application.

Claim Rejections Under 35 U.S.C. § 112:

Claims 1, 2, 6, 8, and 9 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claims 8 and 9 have been cancelled and claims 1, 2, and 6 have been amended to eliminate the phrases "cross-hierarchical instrumentation entity," "hierarchical list of design entities," "identifying a list of design entities," and "identifying an instrumentation entity" rendering moot the rejections under 35 U.S.C. § 112 second paragraph.

Claim Interpretation:

The term "instrumentation entity" has been interpreted in the Office Action as equivalent to the term "design entity" as utilized in "HDL Chip Design" by Douglas Smith, 1996, ISBN 0-9651934-3-8, Chapter 5, "Structuring a Design" pages 113-130 (hereafter *Smith*). As explained below, the present claim amendments and newly added claims sufficiently clarify that, as used in the claimed invention, an "instrumentation entity" is structurally and functionally distinct from conventional HDL entities and is therefore not equivalent to a conventional "design entity" as described by *Smith*.

Prior Art Claim Rejections:

Claims 6-9 have been rejected under 35 U.S.C. § 102(b) as being anticipated by *Smith*. Regarding the grounds for rejecting claim 6, the Examiner asserts that *Smith's* depiction and description of hierarchically arranged and linked HDL design entities on page 115 Table 5.1, page 117 Fig. 5.1, page 118 (Three levels of hierarchy), and page 119 (link signals between the two levels of hierarchy) discloses the steps of "defining a cross-hierarchical instrumentation entity within said first level of simulation hierarchy," and "connecting a first input of said instrumentation entity to said first simulation event and connecting a second input of said instrumentation entity to said second simulation event." The grounds for rejecting claims 7-9 are similarly based on the analogy between hierarchically arranged and linked conventional HDL design entities disclosed by *Smith*.

Claims 1-5 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the MS Dictionary in view of *Smith*. Regarding the supporting arguments, Applicants agree that a "comment" is often used merely to describe what a program does, who wrote it and so forth. However, the key functional aspect of a comment syntax as it is utilized in the present invention, and as explained with reference to Figs. 4C and 4D on page 33, lines 9-29, page 41 line 22 through page 43, line 17 and Figs. 11A-11C, and page 81, lines 8-26, and page 82, lines 9-14, is that it is in fact recognized by an HDL compiler and/or instrumentation load tool and processed accordingly. Applicants contend that the use of non-conventional comment syntax is amply described in the specification and figures as essentially being a pre-pended flag that enables the HDL compiler and instrumentation load tool to recognize and distinguish between "design entities" and "instrumentation entities," and is therefore not equivalent to the MS dictionary definition. Namely, the HDL compiler does not connectively instantiate instrumentation entities during compilation of the simulation model. Instead, the HDL compiler responds to the non-conventional syntax designating an instrumentation entity by installing a proto of the entity in memory and leaving the connective integration of the instrumentation entity (instantiation of instrumentation entities using input port mapping) to the instrumentation load tool. In this manner, the model can be "instrumented" without the designated instrumentation entities becoming incorporated into the compiled HDL design. Furthermore, Applicants contend there is no express or implicitly apparent motivation or suggestion in either the MS Dictionary or the

Smith reference to combine one with the other to achieve Applicants' claimed use of non-conventional comments as described below.

Claims 1-3 and 5-6 have been amended to more clearly distinguish Applicants' proposed invention from conventional HDL design entity structures such as those depicted by *Smith*. As explained in the figures and particularly with reference to Figures 4B-4D and Figures 11A-11C, Applicants' proposed invention is directed to leveraging comment syntax such that the HDL compiler can distinguish between "design entities" (i.e. HDL entities included in the digital circuit or system that is the object of simulation testing) and "instrumentation entities" (i.e. HDL entities utilized to perform facilitate the testing of the entities incorporated in the digital circuit design). U.S. Pat. No. 6,195,627, commonly owned by the assignee of the present invention, claims an invention wherein a non-conventional comment is utilized to associate an instrumentation entity with a target design entity to be monitored.

The present invention provides a mechanism by which instrumentation entities may be interconnected in a manner that leverages the use of non-conventional comment syntax to maintain instrumentation entity independence of the design entities. To this end, independent claim 1 has been amended to recite a data structure for interconnecting instrumentation entities in a manner that prevents instrumentation entity name collisions and simultaneously avoids incorporating the instrumentation entities into the digital circuit logic being tested. Specifically, claim 1 recites a data structure for interconnecting instrumentation logic in a simulation model of a digital circuit design that includes one or more design entities described utilizing a hardware description language, said data structure comprising:

"a first instrumentation entity descriptor field containing data representing a first instrumentation entity, the data representing said first instrumentation entity including a non-conventional HDL comment port mapping syntax processed by a post-compiler instrumentation load tool to instantiate said first instrumentation entity within at least one of said one or more design entities, wherein said non-conventional HDL comment port mapping syntax is recognized by an HDL compiler such that the HDL compiler does not instantiate said first instrumentation entity into the digital circuit design, said data representing said first instrumentation entity using the non-conventional comment port mapping syntax further including a simulation event descriptor field containing data representing a simulation event having a designated event name and that is generated by said first instrumentation entity responsive to one or more input signals from said at least one of said design entities;" and

“a second instrumentation entity descriptor field containing data representing a second instrumentation entity instantiated within at least one of said one or more design entities utilizing said non-conventional comment port mapping syntax, said second instrumentation entity descriptor field comprising an input port mapping field containing data for referencing the generated simulation event to an input port of said second instrumentation entity utilizing an extended event identifier, said extended event identifier including an event type identifier field that specifies a simulation event type and an event name field that includes said designated event name.” Independent method claim 6 and newly added program product claim 10 are amended to substantially include the foregoing limitations. Ample support for the foregoing limitations is provided in the Applicants’ specification with reference to Figs. 4B-4D and Figs. 11A-11C.

Nothing in *Smith* discloses or suggests any type of HDL entity that is described in an HDL using comment syntax such that the entity is only post-compile instantiated in the model. Furthermore, nothing in *Smith* or any other prior art known to Applicants discloses or suggests referencing an input port of such an instrumentation entity to a generated event output from another instrumentation entity utilizing an event type field that specifies an event type (such as a count event, fail event or harvest event) and an event name specifier. Applicants therefore submit that the claims as amended and newly added claims are patentably distinct from *Smith* and the MS Dictionary individually or in combination and a Notice of Allowance to that effect is hereby respectfully requested.

Applicants invite the Examiner to contact the undersigned attorney of record at (512) 343-6116 if such would further or expedite the prosecution of the present Application.

Respectfully submitted,



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